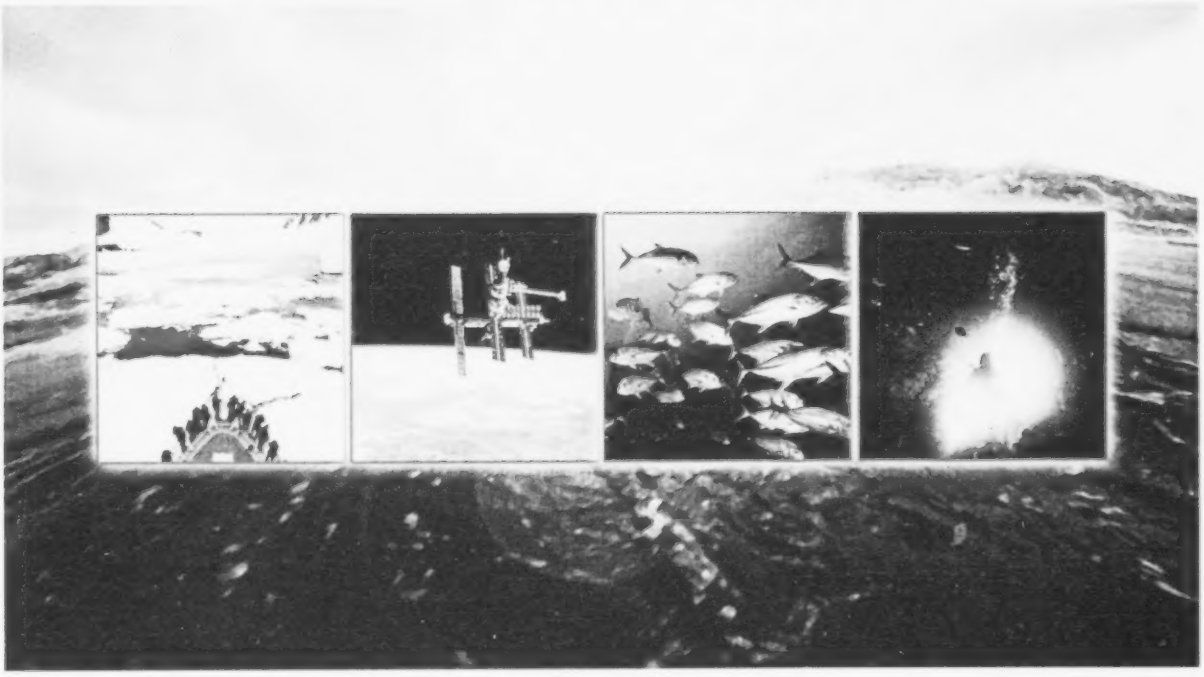
Canada's Pacific Ocean Technology Cluster



Development Action plan - Jan 2004

Innovation and Science Council of British Columbia

BRITISH COLUMBIA
Ministry of Sustainable Resource Management

Vancouver Island Advanced Technology Centre
VIATeC

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CANADA'S PACIFIC OCEAN TECHNOLOGY CLUSTER – A TOOL IN THE DEVELOPMENT OF THE BRITISH COLUMBIA MARITIME ECONOMY, AND A WORLD-WIDE BUSINESS OPPORTUNITY

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The Alignment – the Excitement

With a 25-year foundation in an international marketplace, British Columbia's ocean technology companies currently find themselves with an alignment of opportunities on which to build. These companies are central to a cluster of government, academic and other initiatives and infrastructure which evolves around them.

BC's ocean technology companies find themselves at an interesting crossroads, as several opportunities are aligning to create a unique stepping stone strategy via which government, academia and private sector initiatives will move from market opportunity to commercial success. The launch of the Victoria Experimental Network Under the Sea (VENUS) and the North-East Pacific Time Series Undersea Networked Experiment (NEPTUNE) cabled observatories, support for BC offshore oil and gas projects and the aim to meet needs triggered by the signing of the UN Convention on the Law of the Sea (UNCLOS), will draw together and drive forward the Pacific Ocean Technology Cluster. These factors will support each other and all will in turn contribute to a platform that will steer the cluster into an emerging global market for remote ocean monitoring networks.

The key to cluster capability development involves coming together to respond to market pull and is driven by the need to achieve some economies and optimisation in information generation. The Cooperative Ocean Information Network (COIN) is one lever working on developing the tools to improve accessibility of information. The broader oceans focus evolving at the University of Victoria (UVic) is another stimulus and source for the tools and services needed to compete in worldwide opportunities. There is also a renewed oceans focus, built on Canada's Oceans & Innovation strategies, by the federal department of Fisheries and Oceans, Industry Canada, the National Research Council (NRC), Natural Resources Canada (NR Can) and Western Economic Diversification (WD). The interests of the Province of BC are evident in the ongoing facilitation of ocean technology sector development by the Innovation and Science Council of BC and the needs of the Ministry of Sustainable Resource Management (MSRM) and the BC Offshore Oil & Gas Team.

The next steps involve "bring together" projects. First, the "fix" on the future for the world ocean remote monitoring market must be refined. Second, the cluster capability to respond to the pull of that market for tools, systems and solutions must be mobilised. These steps will contribute to building the cluster and will provide direction for a cluster business plan.

Mission

What we are building is:

> *A Pacific Ocean Technology Cluster serving a world-wide market with the integrated technologies and support needed for "smart" decisions in the management of marine operations, and for security of the environment and territory, to ensure sustainability of coastal communities and maritime economies.*

Achieving the vision drafted in this action plan means that we must continue to pull together the relevant capacity in the region and across the country. The proposed actions will serve to extend the community of interest by providing a renewed opportunity to draw in other companies, research groups and agencies.

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Action Plan for the Pacific Ocean Technology Cluster

Background

Canada is a maritime country. Eight provinces and three territories all border on salt water. At almost 250,000 kilometres, Canada's coastline is arguably the longest in the world (only Indonesia is in a position to challenge this) and its Exclusive Economic Zone encompasses some 3.1 million square kilometres (assuming the full extent allowed should Canada ratify the United Nations Convention on the Law of the Sea (UNCLOS)).

Ocean industries contribute $20 billion annually to the Canadian economy and create up to 350,000 part-time and full-time jobs, especially in coastal communities. Approximately 7 million Canadians live in coastal communities, many of which were established to access marine resources or to be used as marine transportation centres. The ocean technology industry supplies technology (products and services) to enable the sustainability, profitability and safety of ocean activities.

The latest figures from Industry Canada indicate that the ocean technology subsector is made up of about 500 mainly small companies that employ close to 70,000 people, most of whom are well-educated, highly qualified persons. Forty-seven percent of the companies are based in Atlantic Canada and BC and the majority of the rest are located in Ontario and Quebec. Canadian ocean technology is recognised as world-class in many areas and 90% of the market for products and services is outside Canada. The sector is knowledge intensive with many companies directing 30-50% of annual expenditures toward R&D.

Canadian ocean technology companies offer a broad range of capabilities and expertise including:

- Marine technologies and equipment (robotics, sub-sea vehicles, navigation, imaging equipment, oceanic sensors, marine applications programming and information systems used in ocean operations, surface vessels, airborne/spaceborne remote sensing systems);
- Communications and electronics equipment frequently used in marine operations; and
- Professional services (electronic and environmental engineering, offshore platform design, materials and structural design, systems integration, oceanography, meteorology, ocean surveying and mapping).

The complex role of governments in the oceans arena reflects both the governments' economic development responsibilities and their position as a major customer for goods and services in the domestic market for this sector. The federal and provincial governments must play major roles and make significant expenditures in ocean stewardship, management, and governance.

The BC Context

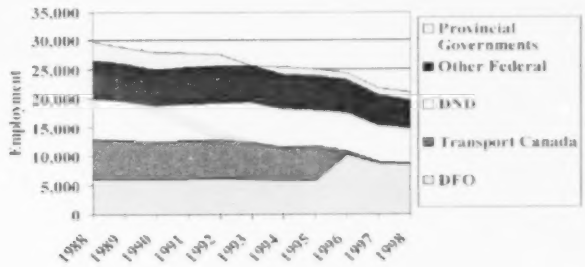
State of Industry

A current study of the Vancouver Island technology industry indicates that the ocean technology sector accounts for the primary focus of 7% of those technology companies surveyed in the region (services, media and internet, and software were the only bigger sectors). The Lower Mainland has several larger remote sensing, submarine and marine engineering companies. However, the sector is dominated by locally owned small and medium sized enterprises, with a few that are branch offices of national or international companies. Many of the BC ocean technology companies continue to earn most of their revenue outside the province, working for multinational industry, oil companies and other governments.

In April 1993, the Innovation and Science Council of British Columbia released the SPARK Oceans[1] report. The report was the result of a year of work by industry, academic and government leaders in the ocean sector. It forecast an opportunity to realize a 50% growth in the value of the ocean economy, a sector of particular significance to the communities and economy of the coast. Unfortunately, little of this potential has been realized in the last 10 years.

This slow progress has not been due to a lack of effort. Companies have slowly built their export markets, scientists have built new research teams, and groups such as the Canadian Ocean Frontiers Research Initiative (COFRI)[2] and the Institute for Pacific Ocean Science and Technology (IPOST) have promoted the opportunity and the need to invest in a renewed approach to ocean science and technology.

The Institute of Ocean Sciences was a cornerstone of Canadian Ocean Science. A cluster of companies grew around both the requirements of the Institute's programs and of those of the Beaufort Sea Oil Exploration programs. Neither of these drivers however, has been as significant in recent years (see graph below)[3].



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[1] ***Innovation and Science Council of BC*** http://www.scbc.org/Init_Info/inin_inli_pu.html,
Ocean opportunities for the West Coast of Canada, A Strategic Framework Overview Report, April 1993

[2] ***Canadian Ocean Frontiers Research Initiative***
An Opportunity for Canada, December 1994

[3] ***Acton White & Associates***
Marine and Ocean Industries in Canada - Importance to the Canadian Economy, January 10, 2002

Industry and other sector players have recently been active supporting efforts to "grow the pie" in an era of changed government and academic roles. These sectors have provided active support in cluster building workshops[4]. They have also invested time in the federal Innovation Agenda, the Marine and Ocean Industry Technology Roadmap and in the development of the concept of Cooperative Ocean Information Network-Pacific. They are considering the merits of adoption of a western node of the Canadian Centre for Marine Communications (CCMC, based in St John's) as a facilitation and business development hub.

In order to bring the ocean technology and broader maritime economic sector together, the Innovation and Science Council of BC is facilitating the formation of an ocean sector task group. The University of Victoria is in the process of mobilising an Oceans Board to provide a focus for its ocean sector activities, bridge with industry and other stakeholders and provide leadership in its evolution as a centre of oceans excellence. One, or both, of these actions may evolve into a "Board of Directors" role for the cluster.

In January 2003, five Sidney-based companies led the formation of Ocean Innovative Systems Inc. The new company has been established as the first step to building a Pacific Canadian capability that will be a world leader in the provision of commercial approaches to develop and supply technology and services to meet market needs for interactive and real time ocean information.

Ocean Innovative Systems Inc. will build on its ability to supply global and national markets with product and service systems based on integration of proven shareholder-company capabilities. It will acquire, develop or align with capability to provide integrated solutions. Ocean Innovative Systems Inc. has three immediate target markets. One is the need created by a commitment to explore, validate, and then exploit the oil and gas potential of the BC coast in a safe and economical manner. Another is the need for components and systems for hi-bandwidth instrumented underwater data collection, monitoring and control that use technology developed with the University of Victoria for the VENUS and NEPTUNE projects. The third is for projects to provide a comprehensive data-base and monitor infrastructure for the ocean areas off the west coast that are critical to the management of our economic zone, homeland security, environmental integrity, commercial development, coastal mapping for essential fish habitat and UN Convention on Law of the Seas etc. This company is expected to incorporate additional members and to develop agreements with associated companies within and outside the region.

State of Enabling Projects

Two critical enabling projects are the University of Victoria (UVic) components of VENUS and NEPTUNE. Both of these have core funding commitments in place. VENUS has just called for proposals to design, build and install the first array. The Executive at UVic has committed to development of the projects in ways designed to foster partnership with, and development of, local industry. The task of developing

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[4] ***Innovation and Science Council of BC*** http://www.scbc.org/pdf/OT_July_2003.pdf
Development of BC's Ocean Technology Sector, An Update, July 2003

approaches and relationships has been given to the above-mentioned Oceans Board. The call for an integrated project approach is in part a response to the request of the ocean technology cluster.

With the fall 2003 commitment by the Government of BC to contribute to NEPTUNE, plans for the development of the Canadian pioneering of NEPTUNE will likely materialize with the identification of development and installation partners early in 2004.

The prospect for BC offshore oil and gas exploration to resume remains somewhat distant; however, as of February 2004, a Natural Resources Canada sponsored Royal Society of Canada expert panel has reported on the state of scientific knowledge of the Queen Charlotte Basin, with reference to the moratorium and any exploration. This may precipitate follow-up environmental reviews and studies by First Nations, governments or industry. Any lifting of the moratorium and proposals for any exploratory seismic or drilling activity will likely trigger environmental studies that may deploy the ocean technology company capabilities, particularly those currently supporting the offshore industry in other parts of the world.

Commitment of Government Agencies

Federal

- Ocean Strategy
    - Emerging force in integrated ocean management
- Revised UN Convention on the Law of the Sea (RUNCLOS) being ratified
    - Follow on commitments?
- Ocean Innovation Action Plan (response to the Innovation Strategy)
    - No formal response
- NRC follow through on Roadmap project?
    - National/regional demonstration project?
- Offshore Oil Moratorium
    - Commitments unclear, but review underway
- Economic development
    - WD may develop its mandate to work with the West Coast maritime economy in response to technological opportunity; a collaborative, focused, strategic plan based on significant economic and market potential.

Provincial

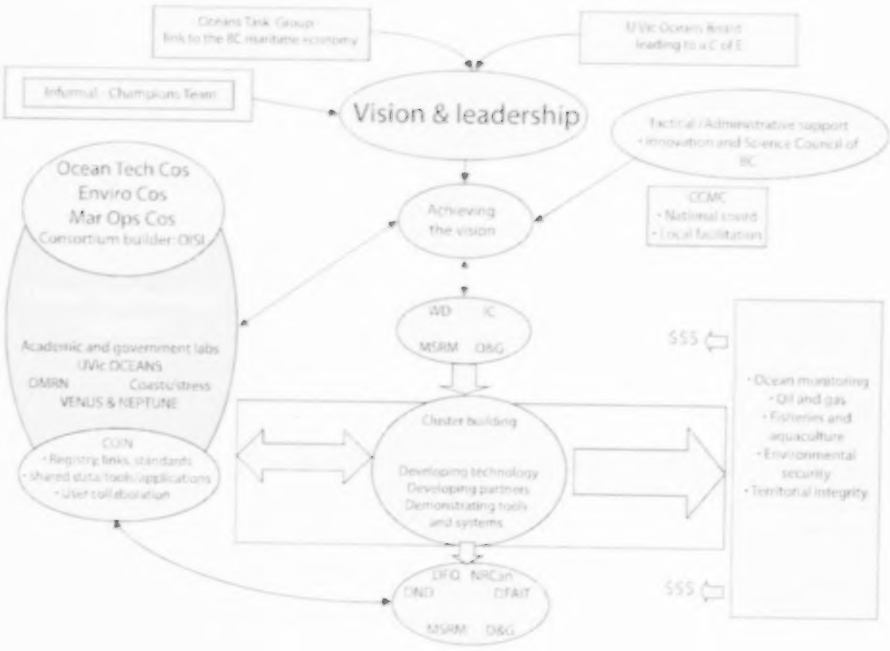
- Offshore Oil and Gas Team
    - Existing UNBC research programme
    - Potential for study of emerging critical knowledge gaps or concerns
- Ministry of Sustainable Resource Management (MSRM)
    - Support for ocean data integration (COIN-Pacific)
    - Completion of atlases, modeling and contingency planning for Queen Charlotte Basin
- Economic development/Heartland Strategy
    - Recent commitment to NEPTUNE

- Innovation and Science Council – currently the oceans champion

Coordinating Efforts and Challenges

The Innovation and Science Council of BC has provided a "leadership from behind" approach, supporting industry in its efforts to cluster and link with academia and government, and promoting links to drivers in the maritime economy. This support has helped mobilise the cluster and has challenged the implicated government agencies (particularly the Province of BC) toward a more coordinated involvement in the sector. COIN-Pacific has grown out of efforts by the BC MSRM to optimise the collection, storage and use of marine geo-referenced data. While this is an important tool, providing another forum for the sector to work together and acting as a potential mechanism to promote infrastructure sharing and collaboration, COIN-Pacific will not emerge as the single focal point that is necessary to develop the cluster.

A loosely coordinated industry-led clustering initiative has made dramatic progress in British Columbia. While there may be discussion of whether we are building a "cluster, community of practice" or a "network," what is emerging is a common focus on market, science, and technology opportunities by an expanding collection of academic, government and industry players who are coming together around the infrastructure and innovation force that will develop with the implementation of the VENUS and NEPTUNE projects.



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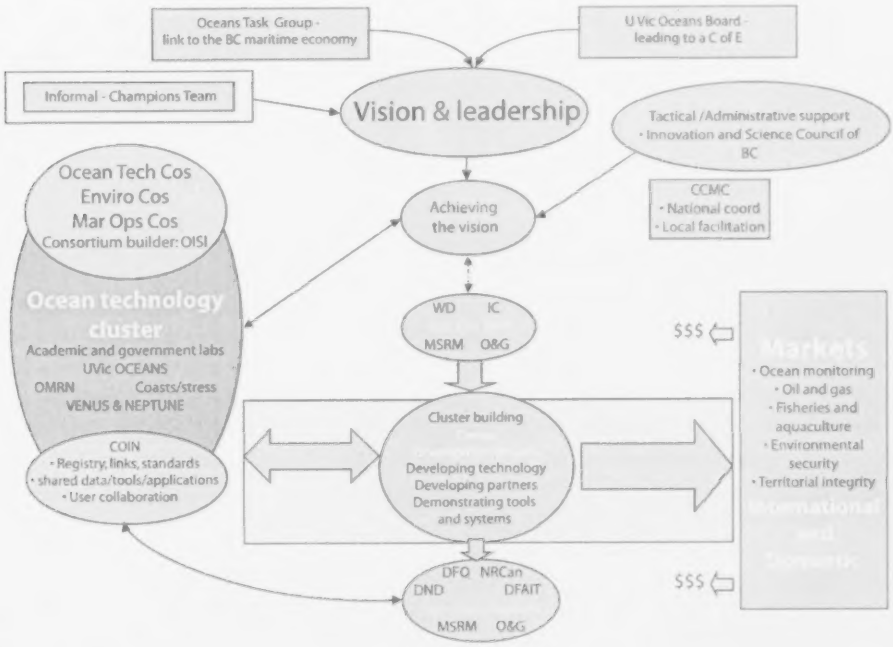


Vision

> *The Pacific Ocean Technology Cluster serves a world-wide market with the integrated technologies and support needed for "smart" decisions in the management of marine operations, and for security of the environment and territory, to ensure sustainability of coastal communities and maritime economies.*

With 250,000 kilometres of coastline and an ocean industry creating 350,000 jobs and contributing $20 billion to the economy, there is no doubt that Canada is a maritime country. Its coastal communities are hubs for marine resources and/or transportation.

Canada's Oceans Strategy recognises the global need for integrated Economic Zone management and territorial security and mandates a renewed focus on our "last frontier". This focus is creating new international and domestic markets as traditional maritime industry is joined by offshore oil, gas, wind, wave and tidal energy, aquaculture, offshore mining, communications, marine biotechnology, tourism, and port security. These opportunities have been recognised in the development of Canada's Innovation Strategy.

The Pacific Ocean Technology Cluster supplies tools, systems, data collection and services that help inform decisions and add value to ensure the sustainability, profitability and security of emerging and traditional ocean economic activities and infrastructure.

This cluster builds on 25 years of success in international markets by individual BC companies. It includes government research laboratories, the emerging science and development infrastructure of the VENUS and NEPTUNE observatories, the developing Cooperative Ocean Information Network (COIN Pacific) and the broad OCEANS focus emerging at the University of Victoria. The cluster pursues collaborative market research, capacity building, marketing, and project execution.

The cluster includes system integrators and solutions service providers to support "smart" ocean management and development decisions. It includes specialised sensors, instruments, field operations and data management and interpretation capability. It provides an array of proven technologies and encompasses an R&D capacity that reaches into government and academic laboratories for the tools, personnel and approaches of the future. The cluster also integrates the traditional and emerging marine industry.

The cluster will support the emerging needs for environmental safety, marine security, and territorial integrity; for sustainable economic activity in coastal heartland communities; for more informed decisions by First Nation and other coastal communities; and for baseline and integrated coastal management for BC. These activities will also serve as a development, demonstration and innovation platform for the cluster in its pursuit of world-wide science, technology employment and business opportunities.

Strategy

The Pacific Ocean Technology Cluster will build on its existing technical and business strengths while pursuing the evolution of science, technology and business related to the VENUS and NEPTUNE observatories for their strategic advantage.

These initiatives will support "smart" decisions in integrated ocean management that will contribute to the sustainability of coastal communities and the economy of British Columbia.

This will in turn demonstrate the capability of the cluster to access a growing worldwide market for decision support in coastal and ocean economies. It will also provide the opportunity to integrate appropriate ocean technology capabilities from other Canadian regions.

The cluster will build laterally into other sectors of the maritime economy, particularly traditional industries such as fishing, ports and shipping. It will work closely with the emerging needs of offshore oil, gas, wind and wave energy, aquaculture, offshore mining, telecommunications (subsea cables), marine biotechnology, and tourism.

Over time, the cluster will find that many of its tools and services will also secure opportunities outside the maritime sector.

Tactics

- **Adopting a Common Vision – Demonstrating the Potential and Securing Support**

Ocean technologies are disciplines that have been integrated into development and decision support tools to meet an emerging world market. In accepting this vision for the sector, all players must recognise that the market opportunity is real, that the existing capability is relevant and that the components of a developing cluster are in place or can be supplemented.

The cluster must grow through action. Its ultimate composition and organisation can be expected to take shape as a result of the evolution of its market focus and can be expected to build out of its capacity to become broader technically, more closely integrated with the maritime economic drivers and networked with national capability.

- **Building a Blueprint or Business Plan**

This plan must show where the cluster is going and what its economic impacts can be. It must outline a development plan and detail the organisation and resources needed to achieve it.

Before this plan can be created, there are two "go-forward" projects to be done: 1) the definition of a market focus, and 2) the initial planning for a "come-together" development and demonstration project.

- **International Market Analysis and Marketing Strategy**

In order to move significantly beyond a common vision, coordinated technical and market development requires more objective identification and assessment of market opportunity. Feedback from cluster members based on their individual experience and research has provided the "support for 'Smart' ocean decisions" direction, which can drive short-term development and planning while more rigorous market research is underway.

Market intelligence is needed on several fronts. The international offshore oil industry is a known quantity, is capital intensive and clearly understands the need for ocean information. The needs of ports and harbours, other industries, sovereignty and defence environmental integrity, coastal zone and economic zone management are harder to define and less clear as markets.

- **Oil and Gas**

The issue here is to determine what is needed to provide an integrated ocean technology solution to oil industry projects that might extend across disciplines in their exploration and development phase, and continue to serve for "field life".

- **Coastal and Economic Zone Management**

The issue here is one of understanding the scale and type of project, who are likely clients are, and how they do business. It is expected that this topic will show a rapidly evolving field and a challenging target market. While the NEPTUNE project provides a short-term market and development opportunity, it is being seen as a single market example that is most significant as a development and cluster demonstration opportunity.

A market analysis and market strategy development project will be undertaken over the next six months.

- **Feasibility Planning for a Pacific Ocean Technology Cluster Development and Demonstration Project**

The VENUS and NEPTUNE observatory projects are the first integrating and developmental projects in ocean technology to stimulate the Pacific Ocean Technology Cluster for at least the last two decades. These two projects will launch a new approach to ocean science research, establish a research infrastructure in BC and pioneer a new suite of technologies and approaches to monitoring the marine environment. The Pacific Ocean Technology Cluster recognises that it has an opportunity to advance these technologies and approaches to meet Canadian coastal zone needs, and to develop international markets that will employ similar approaches.

A "come together" project is needed. On a national scale it will fit with a renewed focus on oceans and incorporate satellite capacity from NRC's East Coast Oceans Institutes. It will demonstrate tools, systems and services with worldwide markets. It will enable the renewed and sustainable economic development of the coast of British Columbia.

The cluster intends to build on the tools coming from the development of VENUS and NEPTUNE. It will incorporate other developmental tools such as Cooperative Ocean

Information Network (COIN Pacific) and Centre for Applied Remote Sensing, Modeling and Simulation (CARMS). It will use the market pull of national and regional governments and maritime industry needs for decision support ocean information. It will use this pull in order to design a project that also demonstrates these products to other worldwide coastal markets.

The feasibility planning process will define the immediate and ongoing needs for ocean management and development information for the Hecate Strait region. In doing so, it will identify the economic impact that this support might enable through further development of traditional and emerging industry activity. These are critical inputs to the blueprint or business plan.

Feasibility planning will also contribute to defining the technologies, infrastructure and approaches necessary to support ongoing management and development.

- **The Intermediate Cluster Goal – a Cluster Development and Demonstration Project**

The ultimate goal is to mobilise cluster capability in the international market. The demonstration project serves to integrate capability and show it to potential clients and collaborators.

The project concept is to provide access to Hecate Strait to develop baseline information, an understanding of ongoing biophysical processes of the basin, and ongoing monitoring outputs needed by the maritime economic drivers of the coast, the governments and communities. Access, monitoring and decision support needs will benefit from standards and tools provided through COIN-Pacific. To meet these needs, the Pacific Ocean Technology Cluster is proposing to design, develop and install an integrated monitoring system of fibre-optic cables, buoys, ships of opportunity, AUV's, sensors, instruments, mapping and real-time monitoring. This project will survey and "wire" the Hecate Strait. It will draw together all industry, academic and government players in the sector. It will exploit the technologies and systems being developed in the VENUS and NEPTUNE projects.

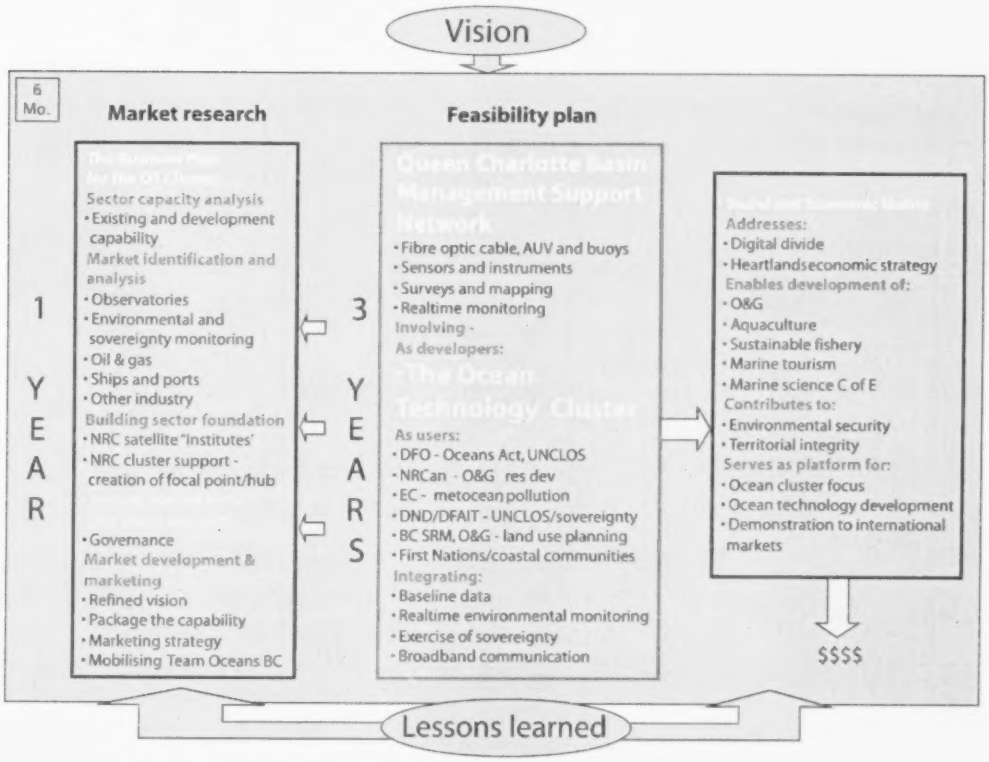
The project may include:

- Some baseline mapping of the basin (supports UNCLOS priorities for SEAMAP)
- One or two VENUS-scale cables into basin
- Instruments and sensor packages to support the resource use and monitoring needs for the region
- Access to/enhancement of the communications capacity within the region
- Potential for development and expansion based on further developments in VENUS, NEPTUNE and other observatories

The users, whose needs will be mobilised to "pull" the design of this project, are:

- Fisheries and Oceans
- Natural Resources Canada
- Environment Canada
- Department of National Defense
- Department of Foreign Affairs and International Trade

- BC Offshore Oil and Gas Team
- BC Ministry of Sustainable Resource Management
- Border security
- BC offshore hydrocarbon leaseholders
- Aquaculture companies
- Fishery operators
- Other maritime industry
- ENGO's
- Others involved in coastal land use planning, economic activity and environmental monitoring.



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